What is claimed is:

1. An active noise and vibration control system for generating an antinoise signal to attenuate a narrowband noise signal propagating through a medium, said active noise and vibration control system performing on-line noninvasive secondary path modeling, said system, comprising:

a reference sensor operable to receive a reference signal related to a primary noise and to generate a primary signal in response;

a secondary source operable to generate an antinoise corresponding to a secondary signal that attenuates the primary noise;

an error sensor operable to receive a residual signal that is the superposition of said primary noise and a secondary noise at the location of said error sensor, and to generate an error signal in response thereto; and

a controller operable to receive said primary signal and said error signal and to generate said secondary signal while performing on-line noninvasive secondary path modeling, said controller comprising an on-line noninvasive secondary path modeler operable to receive said primary signal, said secondary signal, and said error signal for the purpose of calculating said secondary path model.

2. The system according to claim 1, further comprising:

an online noninvasive secondary path modeler to capture two data sets comprising a reference signal, an error signal and generated secondary signal, to calculate a transfer function of said secondary path, and to alter an output of a secondary source by adjusting output filter coefficients in amplitude, in phase, or in both amplitude and phase between acquisition of said data sets, thereby imposing linear independence on said data sets.

3. The system according to claim 1, wherein said secondary path modeler uses said data sets to calculate a secondary path model algebraically in a system of two equations-two unknowns.

4. The system according to claim 3, wherein an equation derived from said algebraic calculation is modified to account for spectral leakage and narrowband effects.

5. The system according to claim 4, wherein said derived equation is modified to account for multiple frequency signals, and frequency spectrum is divided into subbands to scale each frequency component separately.

6. A feedforward active noise and vibration control system, comprising:

a controller for receiving a primary signal and an error signal and generating a secondary signal in response thereto, said controller comprising: an on-line noninvasive secondary path modeler; and an adaptive filter utilizing block time domain or equivalent frequency domain processing.

7. The system according to claim 6, further comprising:

an online noninvasive secondary path modeler to capture two data sets comprising a reference signal, an error signal and generated secondary signal, to calculate a transfer function of said secondary path, and to alter an output of a secondary source by adjusting output filter coefficients in amplitude, in phase, or in both amplitude and phase between acquisition of said data sets, thereby imposing linear independence on said data sets.

8. The system according to claim 6, wherein said secondary path modeler uses said data sets to calculate a secondary path model algebraically in a system of two equations-two unknowns.

9. The system according to claim 8, wherein an equation derived from said algebraic calculation is modified to account for spectral leakage and narrowband effects.

10. A method for calculating an accurate secondary path model, comprising:

employing a secondary path modeler to capture two data sets comprising a reference signal, an error signal and generated secondary signal;

using said secondary path modeler to calculate the transfer function of a secondary path; and

using said secondary path modeler to alter an output of a secondary source by adjusting output filter coefficients in amplitude, in phase, or in both amplitude and phase between acquisition of said data sets, thereby imposing linear independence on said data sets.

11. The method according to claim 10, wherein said secondary path modeler is noninvasive.

11. The method according to claim 10, wherein said secondary path modeler uses said data sets to calculate said secondary path model algebraically in a system of two equations-two unknowns.

12. The method according to claim 11, wherein an equation derived from said algebraic calculation is modified to account for spectral leakage and narrowband effects.

13. The method according to claim 12, wherein said derived equation is modified to account for multiple frequency signals, and frequency spectrum is divided into subbands to scale each frequency component separately.

14. A method for noninvasive on-line secondary path modeling for a filtered-X LMS algorithm for the active control of periodic noise, the method comprising:

using linear independence of two equations and two unknowns to arrive at a secondary path estimate in a secondary path model; and

achieving said linear independence by adjusting an output of a control filter via filter coefficients prior to acquisition of a second set of data corresponding to a second of said two equations;

wherein operation of said control filter is stable so that reliable noise cancellation performance is achieved.

15. The method according to claim 14, wherein said secondary path model is based in a frequency domain.

16. The method according to claim 14, further comprising:

testing on a transducer-less electrical system for validation of active noise control algorithms, said transducer-less electrical system comprising a summing junction circuit and a computer housing an adjustable filter and signal generators;

validating using sinusoidal and dual-frequency signals;

tracking system changes by conducting tests when frequencies are shifted and said secondary path is changing; and

comparing secondary path estimates to estimates ascertained using an LMS-based adaptive filer.

17. The method according to claim 16, wherein said summing junction simulates an interference between a primary and a secondary disturbance.

18. The method according to claim 16, wherein said adjustable filter provides a time-varying secondary path.

19. The method according to claim 16, wherein said signal generators provide a reference signal.

20. A method for on-line noninvasive secondary path modeling, comprising:

receiving, by a reference sensor, a reference signal related to a primary noise;

generating, by said reference sensor, a primary signal in response to said reference signal;

generating, by a secondary source, an antinoise corresponding to a secondary signal that attenuates the primary noise;

receiving, by an error sensor, a residual signal that is the superposition of said primary noise and a secondary noise at the location of said error sensor, and to generate an error signal in response thereto; and

receiving, by a controller, said primary signal and said error signal;

generating, by said controller, said secondary signal while performing on-line noninvasive secondary path modeling, said controller comprising an on-line noninvasive secondary path modeler operable to receive said primary signal, said secondary signal, and said error signal for the purpose of calculating said secondary path model.

21. A method for feedforward active noise and vibration control, comprising:

receiving, by a controller, a primary signal and an error signal and generating a secondary signal in response thereto, said controller comprising: an on-line noninvasive secondary path modeler; and an adaptive filter utilizing block time domain or equivalent frequency domain processing.